



How Gardening and a Gardener Support Program in Detroit Influence Participants' Diet, Food Security, and Food Values

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ABSTRACT

The purpose of this study was to explore the perceived dietary impacts of gardening among members of a gardener support program in Detroit, Michigan. Qualitative interviews were conducted with 28 racially diverse members of the program. Participants reported increasing their consumption of vegetables, trying new vegetables, and decreasing their processed food and meat consumption. Gardeners described factors that contributed to these dietary changes, including knowing that their produce was grown without synthetic chemicals, preferring the taste and freshness of the produce they grew and an emotional connection to their vegetables. Gardening was also associated with some aspects of food security, with most interviewees reporting savings on food due to gardening, and many preserving produce to last beyond the growing season. Gardeners demonstrated strong values towards food, including a distrust of the industrial food system and a desire to make food choices that were beneficial to humans and the environment. This study describes how and why gardening can contribute to dietary change.

KEYWORDS

Community gardening; urban agriculture; food security; nutrition; diet

Introduction

Fruits and vegetables are not only important sources of nutrients such as vitamins, minerals, and fiber, but they are also linked to the prevention of lifestyle-related chronic diseases.¹⁻³ However, the vast majority of American adults do not meet Dietary Guidelines for Americans recommendations to consume between 2 and 3 cups of vegetables and between 1 ½ to 2 cups of fruit per day, depending on calorie needs.⁴ A study using data from the national Behavioral Risk Factor Surveillance Study found that average intake among adults was 0.8 cups per day for fruit and 1.3 cups per day for vegetables, and only 8% and 14% of adults met the vegetable and fruit recommendations, respectively.⁵ Fruit and vegetable consumption is even lower amongst low-income adults and adults with food insecurity,^{6,7} which affects 12.3% of U.S. households.⁸

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Gardening is one promising means of both increasing fruit and vegetable consumption and improving food security. Cross-sectional studies have found that community gardeners consume fruits and vegetables more often than non-gardeners,^{9–11} and in both home and community garden intervention studies, gardeners perceive they eat more fruits and/or vegetables after gardening.^{11–15} In qualitative studies, gardeners report having improved access to high-quality fresh produce.^{12,14,16–19} There is also quantitative evidence for gardening's contribution to food security. In a home gardening intervention, before gardening 31.2% of participants reported sometimes or frequently worrying that food would run out, which dropped to 3.1% after gardening; however, there was no control group for this study.¹⁴ Additionally, one study found that food insecure community gardeners more strongly agreed that gardening had increased their fruit and vegetable consumption and decreased their spending on food.¹⁵

Food Environment in Detroit

The retail food environment in Detroit is dominated by small food retailers, such as corner stores and convenience stores, which often do not sell fresh produce.²⁰ When produce is sold at these food retailers, it is oftentimes of poor quality.²¹ Small food retailers outnumber supermarkets and large grocers 11 to one within the city.^{21,22} Focus groups reveal that Detroit residents have negative perceptions of these stores, including that these stores have low-quality food, unclean and unsanitary conditions, and price gouging.²³ Low income is another serious barrier to healthy eating for many Detroiters. The poverty rate in Detroit is 39.4%, one of the highest of any major city in the country, and Detroit's unemployment rate of 9.9% is more than double the national unemployment rate.^{24,25}

Keep Growing Detroit

Detroit has a vibrant urban agriculture community, which is in part spurred by Detroit residents' and community leaders' desires to improve access to fruits and vegetables and improve health and food security in Detroit. The non-profit organization Keep Growing Detroit plays an important role in supporting the gardeners and farmers of Detroit through an integrated fabric of programming that includes resource, educational, and social/networking support for gardeners and farmers.

The backbone of Keep Growing Detroit's programming is the Garden Resource Program, which provides a large number of diverse seeds and plants for a small annual fee, and access to technical gardening support from the organization. The organization defines community gardens as gardens where members of two or more families garden together, family gardens as gardens where one or more members of a single family garden,

school gardens as gardens located at schools for use by youth, and market gardens as gardens where produce is grown primarily for sale. The gardens they support are located within Detroit's city limits, as well as Hamtramck and Highland Park, two municipalities geographically located within the city of Detroit. In 2017, over 1500 community, family, school, and market gardens were enrolled in the Garden Resource Program. In addition to the Garden Resource Program, Keep Growing Detroit runs the Grown in Detroit program for gardeners to sell their produce and receive 100% of the profits.

Keep Growing Detroit offers a wide variety of educational classes that cover topics on gardening, cooking, and good gardening practices for preventing lead exposure, such as covering all bare soil with mulch or vegetation, washing produce before consumption, and removing dirty shoes before entering homes. Less than 20% of the soil samples tested since 2003 have exceeded the action level of 320 parts per million estimated lead, (Ashley Atkinson, personal communication) and safe growing practices are used for high lead areas such as selecting another site for growing or growing food in raised beds with new soil.

Building relationships is a tenet of Keep Growing Detroit's work, and the Garden Resource Program is designed to foster a social network of gardeners who can build on each other's knowledge and experience. They host a number of social events for gardeners each year, which allow even family gardeners to be part of a network of gardeners throughout the city. Another social opportunity they support is volunteer work, both with the organization itself and with other gardens that are members of the Garden Resource Program. By volunteering, gardeners gain access to additional resources for their garden, such as compost and free soil tests.

Keep Growing Detroit believes there should be places to grow food in every neighborhood in the city, so their staff works to grow connections with residents and community groups through active participation and networking at community events and with diverse community partners. They work to ensure that their outreach and communication strategies are accessible to all Detroiters, by mixing door-to-door organizing, reminder calls, and mailings with text messages, email, and Facebook. With a focus on reaching low-income residents, Keep Growing Detroit has developed relationships with numerous organizations that currently serve Detroit's most vulnerable populations, such as the Detroit Health Department's Women, Infants, and Children clinics, neighborhood food pantries, and early childhood Head Start agencies. With several Spanish speakers on Keep Growing Detroit's staff, they have significantly increased their capacity to reach and serve the Spanish-speaking population in the city. To further increase accessibility, they continue to develop efforts to improve their diverse outreach and communication strategies to reach new audiences, including making more

of their programs compatible with enrollment using Electronic Benefit Transfer payment option.

The purpose of this study was to qualitatively examine experienced Garden Resource Program participants' perceptions of whether, how, and why gardening and participation in the gardening support program has influenced their dietary patterns, food security, and values and beliefs related to food. Previous qualitative studies have examined the impacts of gardening on diet, food security, and food values, but few have been conducted in urban U.S. cities with mostly African American participants. As Detroit's population is mostly African American,²⁵ the majority of interviewees in this study are African American to ensure that their perspectives are represented in this research. Additionally, the role of gardener support programs in influencing gardeners' diet, food security, and food values has not been addressed in the previous research.

Social Ecological Model and Gardening

The social ecological model posits that dietary habits are influenced by factors at various levels, including the individual level, interpersonal level, settings, and policy and systems.²⁶ Gardening can influence fruit and vegetable intake through the individual, interpersonal, and settings levels of the social ecological model.^{27,28} Gardening can influence attitudes and preferences for eating fruits and vegetables.²⁸ The Garden Resource Program focuses much of its programming on interpersonal interactions, where gardeners can interact with each other to learn about food systems and nutrition. Gardening influences the settings level of the social ecological model through providing increased access to fresh, high-quality vegetables. The Garden Resource Program also facilitates affordable access by offering seeds, transplants, and other gardening resources at a very low cost.

Methods

This project used a community based participatory research (CBPR) approach and was conducted in collaboration with Keep Growing Detroit. The CBPR approach was developed in response to the history of health research in communities of color and low-income communities not only failing to benefit those who participate in research, but in some cases severely harming them.²⁹ CBPR aims to address these issues by adopting a collaborative approach where decision-making and power are shared between researchers, community partners, and community members.²⁹ Additionally CBPR incorporates the local and contextual knowledge and skills of community partners and community members, which improves the feasibility and real-world application of research.²⁹

The study was approved by Michigan State University's Institutional Review Board for Human Subjects.

Research Committee

A committee made up of Keep Growing Detroit staff, Garden Resource Program members, and researchers was created to plan and conduct this study. The committee consisted of six Garden Resource Program members, one staff member at Keep Growing Detroit, and two researchers. Preliminary results of the qualitative data analysis were presented to the committee for feedback.

Recruitment and Informed Consent

For this study, Keep Growing Detroit recruited 28 participants who had been members of the Garden Resource Program for at least two years. Participants were chosen through purposive sampling to vary in demographic characteristics (race, age, gender) and type of garden (school, market, family, community). Demographic characteristics of participants are found in [Table 1](#). There were an equal number of male and female participants, with the majority over 50 years old and identifying as Black or African American. Prior to interviews, participants completed informed consent for participation in this study. Data saturation was reached and was determined by the absence of new emergent themes found in the interviews.

Table 1. Demographic characteristics of participants*.

	Number of Participants
Gender	
Female	13
Male	13
Race	
White	4
Black or African American	17
Hispanic or Latino/a	1
American Indian or Alaskan Native	1
Multiple races or other	3
Age in years	
<18	1
31–40	2
41–50	2
51–65	12
66+	8

*Two participants declined to complete the questionnaire, one additional participant declined to answer the age

Data Collection

Semi-structured qualitative interviews were performed. Topics included in the interviews were chosen by the research committee, and the principal investigator created interview questions based on these topics. The research committee gave feedback on these questions to the principal investigator. The interview guide included open-ended questions on how gardening and involvement in the Garden Resource Program impacted the interviewees in the areas of dietary patterns and food security, as well as attitudes, beliefs, and values towards food. The interviews were conducted by three committee members: two members of the Garden Resource Program, and the principal investigator. The two committee members who served as interviewers were trained in qualitative interviewing techniques by the principal investigator. Interviews were tape recorded, transcribed, and transcripts were checked for accuracy. Additionally, participants completed a demographic questionnaire including age, race, and gender.

Data Analysis

Transcripts were analyzed in Atlas.ti qualitative data analysis software.³⁰ Based on the interview guide questions, themes identified during transcript checking, and nine randomly chosen interviews, a preliminary codebook was developed with emergent themes related to the specific aims by the first author. The preliminary codebook included code definitions and examples of when to apply them for some codes. After the preliminary codebook was developed, an additional nine interviews were coded independently by each of two trained coders. The two coders discussed coding differences and reached consensus on coding. The codebook was continuously modified to clarify definitions, add new codes, and combine existing codes that were similar. The first author coded the remaining interviews. Four main themes were chosen for analysis and are described in the results section. For each of these main themes, summary statements were written for each gardener and put into conceptually clustered matrix displays.³¹ Conclusions were drawn based on the comparison of summary statements across gardeners. Participant names were replaced with numbers to ensure participant confidentiality.

Results

The results are organized into four main themes: perceived dietary changes, reasons for a change in intake, food security, and food values. Each main theme had subthemes as follows. Perceived dietary changes included subthemes of increased vegetable intake and changes in intake of other foods

and food groups. Reasons for change in intake included subthemes of taste and freshness, gardening organically, an emotional connection to the produce they grew, a desire not to waste their produce, and to improve their health. Food security included subthemes of saving money and food preservation. Lastly, food values included subthemes of industrial food, seasonality, alternative, food networks, and interactions with other gardeners.

Perceived Dietary Changes

Interviewees described multiple dietary changes that they attributed to gardening. This included not only an increase in vegetable intake, but also decreases in other foods and food groups.

Vegetable Intake

The majority of interviewees indicated that their intake of vegetables had changed in some way due to gardening. Some reported eating more vegetables overall or an increase in certain types of vegetables, eating more fresh vegetables, a greater variety of vegetables, or trying new vegetables. Green leafy vegetables like kale, collards, and Swiss chard were new to many of the gardeners, who began eating them because of gardening or receiving the seeds and seedlings from the Garden Resource Program. For example, gardener 12 explained, “I think it [the garden] makes me try new things like kale, I don’t know if I would have gone to the store and bought kale... but they have it and it’s part of, you know, your membership.” Gardeners also gained access to vegetables they were not able to purchase, as gardener 20 explained: “You go to the grocery store, you have to get whatever they have. I have the heirlooms [tomatoes], all kinds.”

For some, having vegetables from the garden resulted in meals that were more vegetable-centered. Some gardeners reported eating mostly out of the garden during the summer months, while others planned meals around what was available from the garden or added more vegetables to dishes. Gardener 19 stated, “My meals are not the same, they may consist of soups made out of all the different vegetables out of my garden.” Gardener 2 explained how having an abundance of a vegetable from the garden led him to use that vegetable in a new way: “All this kale! I had to find things to do with that. I have never made smoothies until I had a garden...I did not know that smoothies were like the bomb.”

Some gardeners reported that the garden has changed the diets of their family members. Gardener 18 reported how the garden influenced her husband and adult children:

I always make sure I eat a lot of vegetables and fruit to the point that my husband and my family have gotten into eating healthy...I have older children...they come

and actually pick from the garden and get their own....so, it has impacted my family immensely.

Gardener 16 reported how the garden influenced the diet of her young child:

My daughter is growing up with it [the garden] ... It's kind of amazing how much she likes vegetables... actually some mornings I'm guilty of not feeding her breakfast, and just going outside and working in the garden and she just like eats the tomatoes and eats the beans.

Intake of Other Foods and Food Groups

In addition to changes in vegetable intake, many gardeners also attributed changes in intake of other foods or food groups to gardening. A number of gardeners stated that they eat little to no meat and/or have excluded red meat from their diets. Gardener 19 stated, "I don't eat any meat anymore...because I get everything I need from my vegetables." Some gardeners also attributed eating less of other foods, such as fried food, processed food, or starches, to gardening. For some, these dietary changes occurred because of nutrition education coordinated with gardening, as gardener 17 explained:

Well I do read labels, I do watch the salt intake....The awareness of all that came through going through the Garden Resource Program...and then we started even having healthy eating classes at church through some of the programs that Youth Grow Detroit and Keep Growing Detroit had....The learning process has taken on, has come to the point where you are cognizant of what you purchase.

Other gardeners did not explicitly state what about gardening had changed their intake of foods, but did attribute the change to gardening, such as gardener 10:

Gardening in a nutshell has shown me about food...I wouldn't have known how damaging food is [if it hadn't been for gardening]... I put [processed] food in the same category as drugs and alcohol...Some of the same dangers in alcohol and drugs is in processed food. When you asked what has [the] garden done for me, it's educated me.

Reasons for Change in Intake

Gardeners mentioned a number of factors that may explain why gardening leads to an increase in vegetable intake. This included the freshness and taste of the produce they grew, gardening organically, an emotional connection to growing food, and not wanting to waste the food they grew. Additionally, some gardeners described diet changes that were health-related, which were only related to gardening for a few gardeners.

Taste, Freshness

The superior taste of garden vegetables compared with store-bought was a prevalent theme amongst interviewees. Some gardeners attributed this to

the freshness of the produce they grew. As gardener 5 states, “at the store sometimes you got stuff that look like it’s been there 20 years and, you know, it’s fresh out the garden, it has a different taste.” Others attributed the taste difference to gardening without pesticides, as gardener 11 describes:

The thing that moved me was the taste. I had never tasted fresh, no chemicals in vegetables [until growing my own]...I would say wow, the difference is phenomenal...It is hard to describe the difference in the taste with no chemical and the taste with chemicals.

Gardener 9 stated that he did not have to worry about food-borne illnesses with his garden’s produce because it was fresh:

They grow cilantro in California...They bring to Detroit and they take more than three-four days. When they sell in the store they had the black spots in the leaf and later they say it’s E. coli ... but since we have fresh food growing here and so we don’t need to worry.

Gardening Organically

Overwhelmingly, gardeners reported that they gardened organically or did not use chemicals in their gardens, with some stating that the Garden Resource Program spurred them to garden organically. Gardener 17 said,

So realizing that you don’t have to put fertilizations other than natural fertilizers on crops...For the longest [time] you always thought people had to go get Miracle Grow, you know what I am saying? But now we’ve learned that there was another way and it is more healthier for you, but again, again all of that [came] from learning, you know, from the team that came on and helped us to develop our garden program [Keep Growing Detroit].

This quotation demonstrates the most commonly cited reason for gardening organically: perceived negative impacts of agricultural chemicals on human health. Many believed that the vegetables they grew were healthier because they were grown without pesticides, and for some, this was not a concern until after they began gardening. As gardener 14 said,

We are eating food that we can just take, pick, and eat...You don’t have to wash it [because we don’t use pesticides], and that, that’s a big deal and I think until you’re actually growing it yourself you don’t realize how big a deal that is...Growing them without that, I just feel so much healthier eating them...It was nothing for us to buy food that was sprayed until we really started gardening ourselves.

Knowing how their vegetables were grown and having control over chemical inputs was important to many gardeners. Some gardeners attributed an increase in their vegetable consumption to this, including gardener 8: “Knowing where the fresh fruits and vegetables came from, knowing how the soil is cultivated, knowing what’s in the soil makes me more willing to consume it.” In addition to distrusting agricultural chemicals, a number of

gardeners were also wary of genetically modified organisms (GMO's), and valued that the vegetables they grew were non-GMO. As gardener 15 said of GMO's, "These must be doing something to your body. You can't change nature without it changing you, so I just don't trust it."

Emotional Connection with Growing Food

Gardeners expressed an emotional connection to growing food, as well as the vegetables they grew. Gardeners used the words "miracle," "love," and "magical" to refer to the process of growing food, including gardener 19 who said

So that's why you need more people doing gardening, because then you will have more love, you know, people that are really concerned about the foods that we eat. Because I am sure that the food feels your love, the leaves feel your love, you know, they feel this person really loves you.

Gardeners also valued eating food that they grew themselves, such as gardener 13, who stated, "It's always such a gift to be using something and what we're cooking that we had a hand in growing." Gardener 10 explained how this emotional connection can lead to eating more vegetables: "Well, my experience with gardening ...we touch it, we going to want to eat it and...[it] just has that appeal." For some, gardening was more than just growing food, it was a way of life. According to gardener 23, "Then if you don't grow, you know you are just missing the whole idea of what eating is. Eating real natural food is a wonderful, wonderful way to live and so much cheaper, if you buy, if you grow it yourself." Some gardeners expressed feelings of pride for the vegetables they grew, and valued the self-sufficiency that came with gardening. As gardener 16 said, "Like when those green beans start coming in, I can't [help] but be so proud. Like okay, the green beans won't stop, they just keep coming and coming. So being able to, and knowing like, I have the skills to feed my family."

Waste

A number of gardeners mentioned not wanting to waste what they grew, which in part explains what motivates people to incorporate the produce into their diets. According to gardener 7, "For one thing when you grow something, you really don't want to see it go to waste. I think you're much more cognizant and aware of waste and not wanting to do that. So that means you more intentionally try to get it in your diet or share it with others."

Health-Related Diet Change

Some gardeners reported diet changes that were not related to gardening, or were peripherally related to the garden. Gardener 27 was unsure if there was a change in his diet because he has been a vegetarian as long as he has been gardening. Other gardeners reported that they have been trying to eat

healthier due to health problems, including being diagnosed with diabetes and a husband's high cholesterol. Gardener 19 reported that when she was diagnosed with cancer that her diet changed tremendously:

Then when I found out I was sick, I really you know got into more different types of vegetables, so that's how gardening has been impacting me because before, you know, I was kind of like doodling around with it and everything and I always tried to eat healthy but I eat really healthy now, I mean every day of my life, I eat real healthy.

Food Security

Many gardeners reported saving money on food because of the garden and preserving their garden's produce.

Saving Money

Most gardeners agreed that they saved money on food from the garden. During the growing season, many explained that they bought little from the grocery store. Gardener 9 said, "Three or four months [of the year] I don't buy nothing from the store...only the meat." Gardener 1 said, "When I had six kids I fed them from the end of June to the end of October totally out of the garden...not totally, but for a big part." None of the gardeners knew exactly how much they saved from the garden, but those that speculated how much they saved estimated several hundred dollars per year. Some gardeners reported that the primary reason they gardened was for the financial benefits such as gardener 21: "Well, the reason I'm involved with gardening is because it supplements my income." While few gardeners indicated signs of food insecurity, gardener 19 explained how gardening helped her stretch her food stamp dollars:

I was getting food stamps. I am thinking 'Oh my god how am I going to make this work,' you know, having to buy this for food. And I did...I was only getting like \$87, but I put my program together with the growing of the garden, that helped.

Gardener 23 said,

I will tell anybody, I may not have a dime in my pocket but I will never be hungry. And that's because I've got enough sense and enough love and enough wherewithal to grow my own food and when you grow it organically, it's not a lot of money you have to spend.

While the majority reported saving money due to the garden, some gardeners reported that they did not save money because of the money and/or labor that they put into it. However, few gardeners mentioned that they had put money into the garden. While the costs associated with gardening can be substantial, the Garden Resource Program significantly reduces these costs by providing seeds, transplants, and other gardening resources for a small

annual fee (10 dollars for family gardens, 20 dollars for school, community, and market gardens).

Food Preservation

Food preservation was common amongst the gardeners interviewed. While some canned vegetables, including tomatoes and green beans, many more frozen vegetables. Gardeners froze a wide variety of vegetables, with greens being the most common, as well as tomatoes and corn. Most of the gardeners who froze their vegetables also mentioned they had an abundance that lasted through the winter. As gardener 19 said:

You know the greatest thing about this whole thing is, I didn't have to spend a dime the whole winter ...I didn't have to buy any fresh vegetables for my green smoothies the whole winter, and I am just now getting low [in March].

Having access to their home-grown vegetables throughout the winter was important to gardeners for some of the same reasons they valued eating fresh vegetables from the garden: it tasted better, did not have pesticides, and it was grown themselves. Gardener 25 said,

During the winter months I like to have fresh greens, so I would always put some greens away in the summer and go in the freezer and just – I knew that I grew them, so this is perfect, and not going to the grocery store and just having my own collard greens that I grew.

Food Values

Many gardeners held strong beliefs and values about the food system. This included negative perceptions of the industrial food system. Some gardeners also avoided purchasing produce that was out-of-season and utilized alternative food networks. Interactions and communication with other Detroit gardeners and the staff at Keep Growing Detroit were influential in these beliefs and values.

Industrial Food

Many interviewees had a strong dislike for and distrust of the industrialized food system, from the farming methods used to the foods it produces. As mentioned earlier, many interviewees are particularly concerned about the impacts of pesticides on human health, while there was also concern about the environmental impacts of conventional farming. Additionally, some gardeners were concerned about low wages and poor working conditions of farm workers. A quote from gardener 22 sums up this attitude towards industrial food: “Agribusiness and stuff like that is bad for the land, bad for the people.” Some gardeners also verbalized a strong dislike of processed foods, including gardener 24:

The food industrial complex, with all its advertising, with all its corn syrup-laced foods that promote food addictions...what these types of foods that have been made in the food processing labs do to our taste buds and that psychology, they make us eat way more than we should and make us addicted to food.

Gardener 24 mentioned another idea that was shared by other market gardeners, that urban farming is drastically different than industrial food in the way it affects people and the environment:

We [urban farmers] as a community of people who know that the system that we have in place today as a community or as a society is not sustainable and it doesn't work for a lot of people in the community. So I believe people who are in the urban farming community gravitate to urban farming because they know it's [the current agriculture system] not financially sustainable, it's not environmentally sustainable, and that society as it is today has disenfranchised more and more people right, and so see there is a groundswell of support for a new, a ...paradigm shift in how we think, how we eat, how we buy our food, how we relate to the economy.

Some gardeners were also skeptical of the capability of the food system to provide them with food, as gardener 27 explained:

The model that we have is just, it's a captive model. And you know, unless you get outside the captive model you are willing to get hurt...When these guys decide that they can't make enough money off you they're gone. You're left high and dry, and if you have no transportation or no means to get a hold of food, you are just SOL.

These gardeners stated that growing your own food provides security from a break-down in the food system. Gardener 10 said, "They can black out the food if they choose to and so the more I know about gardening, the more I will be able to survive in that too-large situation."

Seasonality

Some gardeners reported purposefully avoiding buying produce that was not in season. Motivations for avoiding out-of-season produce varied. The most commonly cited was that out-of-season produce, particularly tomatoes, have no taste. Other reasons for avoiding out-of-season produce were values-laden, echoing gardeners' criticisms of industrial food. Some gardeners were concerned about the distance that the produce traveled, how the farmworkers were treated, or not knowing how food from other countries is produced. Gardener 1 describes her motivations and experience with seasonal eating:

I've turned back to seasonal eating. And we've made kind of a ritual of the seasonal eating, you know, I will not buy a tomato unless I can grow it in my own garden or somebody else grew it in their own garden. So I don't have tomatoes 8 months out of the year...And people think that's strange, but you know, it doesn't taste good, it's got to come from very far, it costs a lot of energy to produce. And I'd rather eat my fill of tomatoes for two months. And eat the best and then have this hankering

for the rest of the year, you can't wait until next year rolls around. So it's not like I don't ever buy anything out of season but a lot less, a lot

Alternative Food Networks

Some gardeners bought food from alternative food networks, including community supported agriculture (CSA's), farmers' markets, and fresh produce box programs (weekly boxes of fresh produce that supply local when possible), as well as exchanging food with other local growers. Supporting local economies and local farmers was one of the contributing factors to buying local. As gardener 2 explained,

I really want to wean myself off of going to the grocery store and putting value back into supporting local farmers...and just encourage more people to go to farmers' markets, encourage more people to be a part of CSA's, encourage more people to know their local farmers and buy directly from them.

Trusting other local growers and knowing how they produce food was another reason for buying local. Gardener 3 was willing to spend more for local food because, "the person that grew them just dropped them off. And I don't know who grew those down the street [at the grocery store], I don't know anything about them, so someone called me before these were picked and told me about them, don't you think it's worth a dollar more?" Gardener 8 even preferred buying local fish due to trusting that local producers will follow organic methods. Gardener 8 also explained that he was not concerned with how food is produced until he started gardening:

I prefer to buy seafood from some place here in Detroit...I can go over and probably take a look and see how it is growing and know that they are probably fellow gardeners and feel the same way that I feel way about using products that doesn't have the chemicals, you know basic organic stuff. But you know, when you are buying stuff in the store...you have no idea what those people did to it...[Before gardening] I wouldn't even think about it. Go in the store, grab stuff and okay, now as you get into the gardening and you understand more about the organic and using chemical[s].

Interactions with Other Gardeners

Keep Growing Detroit teaches and encourages organic and sustainable growing practices, which instigated some gardeners to grow organically (described above). Another key influence on gardeners' food values was interactions with other gardeners involved in Keep Growing Detroit. As gardener 1 said,

As I got involved in Keep Growing Detroit and started talking to all the gardeners, you know, attending education classes, listening to discussions, little by little, it took me several years, I became convinced that growing locally and eating locally was-and eating organic was very important for multiple reasons. You know, economic reasons, energy wise, and health-wise....It was not the gardening. It was everything around it, it was the classes, it was the discussions....So it's a long term thing, I don't think it's anything that

you can do in one class, or in one time. It's relationship, and I think that's what Keep Growing Detroit is good at is building relationships... in a very non-threatening way.

Gardener 1 as well as others, emphasized the role of interacting with other gardeners in them valuing local and organic food. Additionally, some gardeners educated themselves about the food system by reading books, watching documentaries, and other sources.

Discussion

This study elucidates perceived dietary changes and impacts on aspects of food security related to gardening, as well as factors that contribute to these changes, amongst racially diverse participants in a gardener support program in Detroit, Michigan. Additionally, this study explored gardeners' values and beliefs around food and food systems.

Numerous changes in vegetable intake were cited by gardeners in our study, including consuming more vegetables overall. Gardening's association with increased vegetable intake has been demonstrated in other quantitative⁹⁻¹⁵ and qualitative studies.^{16,18,32} One potential reason that gardening may increase vegetable intake is the superior taste and freshness of garden produce cited by gardeners in our study, as well as many other qualitative studies.^{12,16-19,32-34} Gardening may be especially influential in increasing vegetable intake in areas like Detroit where produce quality and availability can be poor.^{20,21} Having knowledge of how produce is grown and control over chemical inputs are other potential explanations for why gardening may increase vegetable intake, which was commonly cited amongst interviewees in our study. In our study, as well as other qualitative studies, gardeners had a strong preference for growing food organically and believed that organically grown food is healthier.^{14,18,19,34,35} Additionally, some gardeners in our study displayed an emotional connection to the food they grew, including valuing the food they grew themselves, and feelings of pride for their ability to grow their own food, which we theorize may contribute to gardeners eating more vegetables. This is consistent with other qualitative studies, where gardeners describe feelings of pride, accomplishment, and satisfaction for the produce they grow.^{19,32} The emotional connection towards the food they grew may also explain why the gardeners in our study intentionally incorporated more produce into their diets to avoid wasting it.

Gardeners in our study also tried new vegetables, mentioning kale, collards, and Swiss chard, and began eating them frequently because of receiving seeds and seedling to grow them through the Garden Resource Program. Green leafy vegetables are amongst the most nutritious vegetables and provide key nutrients that are lacking in the American diet.^{4,36} This finding

suggests that gardener support programs can also influence the types of vegetables that gardeners eat through the seeds and plants they provide to participants. Gardeners in our study also reported making vegetables the centerpiece of meals, as well as eliminating or reducing intake of processed foods and meat. This indicates that the diets of these gardeners are becoming more in line with the Dietary Guidelines for Americans.⁴ Some gardeners attributed dietary changes to participating in nutrition education in conjunction with their gardens. Additionally, some gardeners disliked processed food because of its negative effects on human health. This belief was in part influenced by talking with other gardeners at Keep Growing Detroit's classes and social events, where many conversations revolve around gardening, food, and health. This underscores some participants' viewpoint that it was not just the gardening that influenced their diets, but the social exchanges that occurred through being a member of the Garden Resource Program.

Other studies have shown an association between gardening and changes in intake of foods other than fruits and vegetables. In a cross-sectional survey of community gardeners and controls in Philadelphia, gardeners consumed fewer sweets and sweet drinks than non-gardeners.³⁷ In another study, after a community gardening intervention 53% of those who gardened at least once a week reported eating less fast food, and 68% reported eating food that is "fresher (less packaged food)."¹¹ A qualitative study of home gardeners found that after gardening, home gardeners in Toronto preferred buying fresh produce instead of processed or prepared foods.¹⁸ These studies, as well as the findings of our study, provide evidence that gardening can contribute to changes in dietary intake beyond increasing vegetable intake.

Our study also found that many gardeners held strong beliefs and values surrounding the food system. Many distrusted industrialized farming and industrialized food, especially processed food, due to concerns for human health and well-being and the environment. Some interviewees viewed gardening and urban agriculture as a departure from industrialized food in the way that it affects people and the environment. This highlights the importance of values for these gardeners: gardening was not only a way to provide themselves with fresh, healthy produce, but was also a means to produce food that did not harm people and the environment, and avoid the industrialized food system. Gardening was a means to resist the industrial food system. This echoes what White found in interviews with female farmers involved in the Detroit Black Community Food Security Network, an organization that promotes the involvement of Black Detroiters in urban agriculture in the city of Detroit. As one woman she interviewed stated, "You resist when you grow. Gardening resists the corporations that are knowingly putting things that we can't even pronounce in our foods."³⁸ Gardening as resistance to industrial food was also described by gardeners in a study in Australia.¹⁹ In addition to growing food themselves, some gardeners in our study prioritized

purchasing foods in season and through alternative food networks, in part to align their food purchases with their values. In another qualitative study, gardeners also attributed paying more attention to the seasonality of food after gardening.¹⁸

Gardening's food security implications have been examined in both qualitative and quantitative studies. In qualitative studies, gardeners report having improved access to high-quality fresh produce,^{12,14,16-19} and also report saving money on produce in most studies.^{12,14,16,17,33} In our study, most gardeners perceived that they saved money on food from their garden. Recent studies have mixed results regarding food savings from gardening. Two recent studies found that home and community garden plots produced an average of \$339 and \$435 worth of produce,^{39,40} respectively, but another study found that home-grown produce costs an average of 39% more than purchasing produce from the grocery store.⁴¹ Members of the Garden Resource Program are able to access material resources for gardening at a fraction of the retail price. The Garden Resource provides 30 packets of seeds and over 100 transplants to family gardeners for an annual fee of 10 dollars, and school, community, and market gardens receive more than double the number of seeds and transplants for a fee of 20 dollars. They also provide free compost to gardeners who volunteer at least once, offer additional gardening supplies such as raised beds, and have regional hubs where gardeners can rent tools for free. The Garden Resource Program members are able to garden with little financial cost, allowing for substantial savings on food. Additionally, many gardeners preserved their produce for consumption beyond the growing season, which has also been found in other qualitative studies.^{14,17,18,33,34} Some gardeners in this study still had their garden's produce frozen in March, indicating that gardening can provide produce nearly year-round.

Limitations

While this study found that gardening benefits diet and aspects of food security amongst experienced Garden Resource Program participants, these findings may not hold for new gardeners. New gardeners may lack the knowledge and skills needed to produce enough vegetables to substantially contribute to their food security and vegetable intake. While gardeners in this study perceived saving money due to gardening, we did not measure the amount of money spent on gardening supplies or the dollar value of produce grown. Additionally, participants were not asked questions related to income or employment status. Gardening may not be a feasible means of improving dietary habits and food security amongst those who do not have the time to garden or are not interested in gardening. Most interviewees were over age 50 and may have more free time to dedicate to gardening.

Implications for Practice and Future Research

The findings from this study can inform community-based approaches to improve nutrition and food security. There are hundreds of gardener support organizations throughout the United States, and the creation of new gardener support programs can expand gardening's benefits into new communities. Through offering opportunities for gardeners to interact with each other, gardener support programs can create social networks where gardeners learn about gardening, food systems, and nutrition through each other. These programs can influence the dietary intake of their participants by introducing them to new vegetables. Gardening also provides a platform for nutrition education, where gardeners can learn how to prepare the produce from their gardens.

While this study found that participants saved money by participating in a gardener support program, future research is needed to quantitatively measure the potential cost savings from participation in these programs. This is especially relevant for programs amongst low-income and food insecure individuals.

Conclusions

In this study, the majority of interviewees perceived that gardening increased their vegetable consumption in some way. Additionally, some interviewees reported decreasing consumption of other foods, including red meat and processed foods. The findings of our study suggest that gardening can not only increase consumption of healthful foods but also decrease consumption of foods that are overconsumed in the U.S. Gardeners' values related to food, including preferring food grown without synthetic chemicals and distrusting industrialized food, contributed to these dietary changes. This study is unique in that interviews were conducted primarily with African American gardeners living in an urban U.S. city. This study also focused on how involvement in the comprehensive gardener support program available in Detroit influenced gardeners, which has not been addressed in the previous literature. The gardener support program provided a social connection between gardeners of all types (school, family, market, and school), introduced gardeners to new nutritious vegetables, and provided nutrition education in conjunction with gardening. Engaging with other gardeners at classes and events influenced interviewees' diet and values related to food. This provides evidence that gardener support programs provide more than just material resources and education to their gardeners. They can also provide a platform and opportunity to try new vegetables, and for dialogue about food, nutrition, sustainability, and health, which may positively affect gardeners' diets.

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